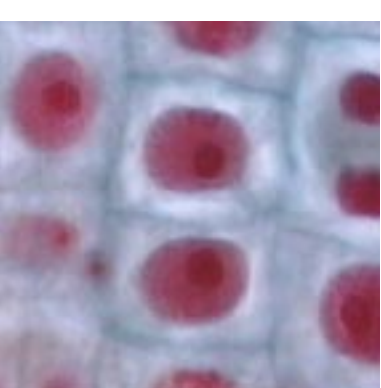
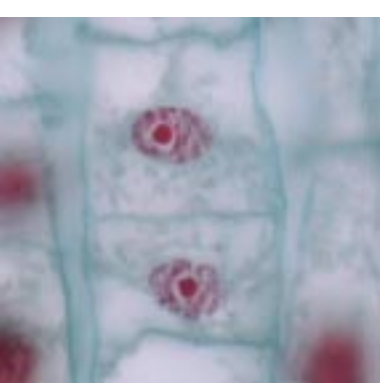
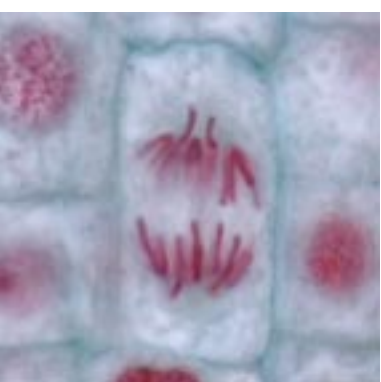
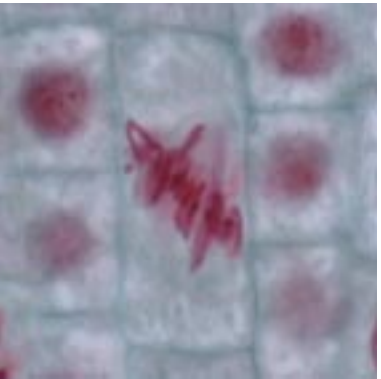
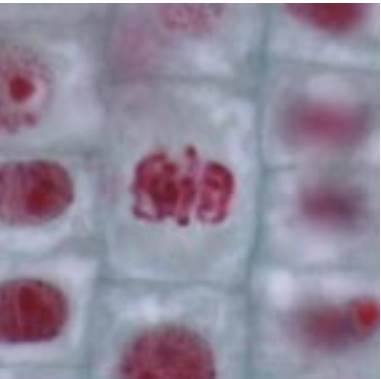
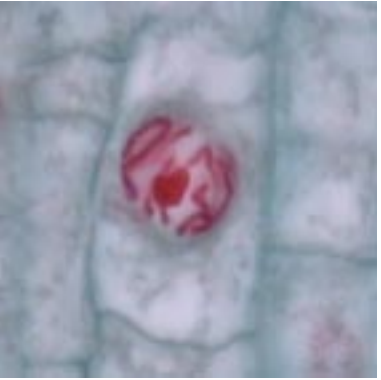
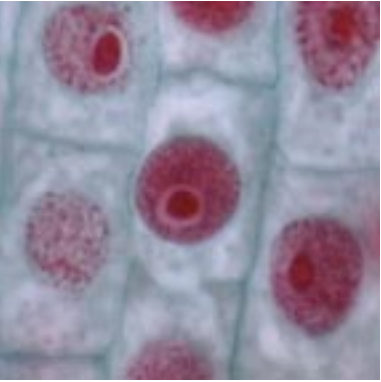
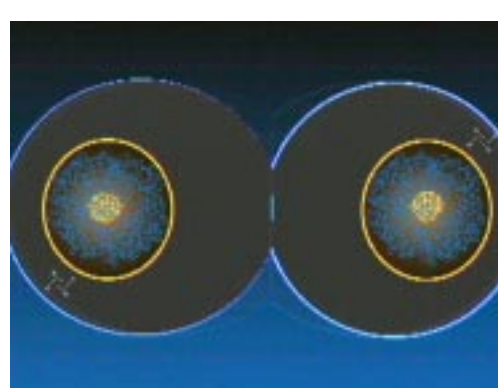
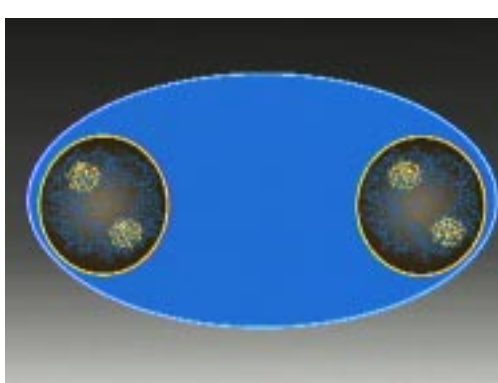
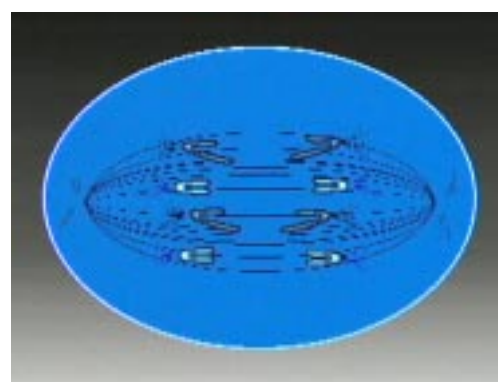
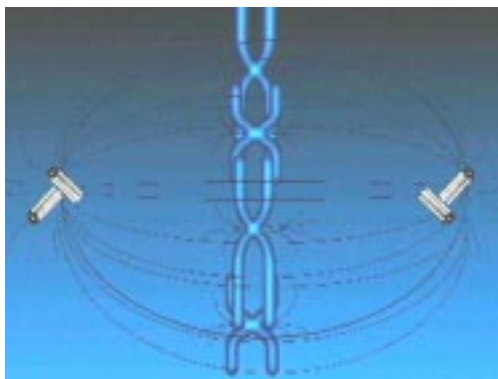
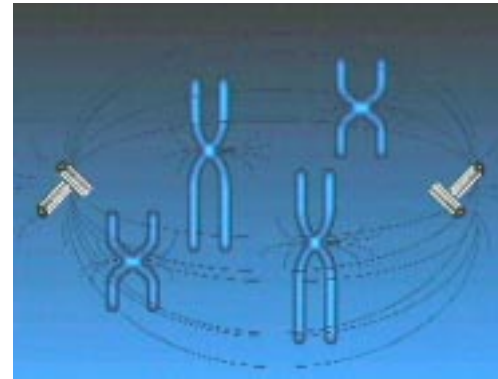
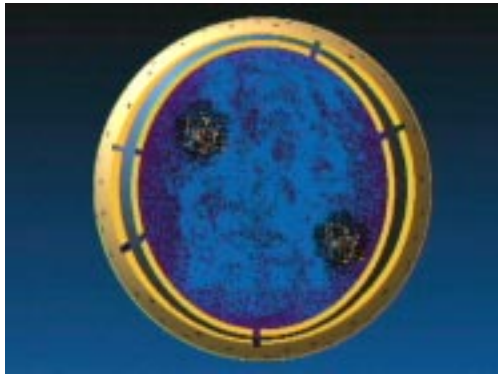


Mitosis

Mitosis in Plants
Stained Onion Root Cells



Mitosis in Animals
Graphics of Animal Cells



Interphase

By interphase the nucleus is visible, surrounded by the nuclear envelope, and containing one or more nucleoli. In the cytoplasm there are a pair of centrosomes and an array of microtubules called asters making up the two centrosomes. Inside the nucleus the chromosomes have duplicated but remain in the more relaxed form of chromatin fibers.

Prophase

The nucleoli disappear and the chromatin fibers condense into chromosomes. These appear as two identical sister chromatids joined at a centromere. The mitotic spindle of microtubules begins to form in the cytoplasm (between the two centrosomes). The centrosomes move to opposite poles, pushed apart by the elongating microtubules.

Prometaphase

As the nuclear envelope breaks down the mitotic spindle interacts with the chromosomes. The spindle is formed from microtubules that elongate to an invisible line at the equator of the cell (the metaphase plate), equidistant from each pole. Other microtubules overlap each other as they grow from opposite poles and some microtubules bind with the kinetochore on each sister chromatid.

Metaphase

All the sister chromatids line up along the metaphase plate such that their centromeres are aligned. On each chromosome, the kinetochores of the sister chromatids face opposite poles and are attached to kinetochore microtubules radiating from each pole.

Anaphase

The paired sister chromatids of each chromosome separate, pulled apart by kinetochore microtubules bonded to each sister chromatid. The chromatids move to opposite ends of the cell. The poles of the cell also move further apart. By the end of anaphase, each end of the cell contains a full complement of the parent cell's DNA.

Telophase

The cell continues to elongate through the action of the non-kinetochore microtubules. The fragments of the original nuclear envelope now form two new nuclear envelopes around the new nuclei at each end of the cell. Each nucleus grows nucleoli again, and the chromosomes relax into less condensed chromatin fibers.

Cytokinesis

The division of the cytoplasm completes the cell cycle. In animal cells a cleavage furrow forms along the metaphase plate. Actin fibers constrict around the middle of the elongated cell, pinching off two daughter cells. In plant cells a cell plate forms along the metaphase plate, and a new cell wall is formed, creating two daughter cells.